

### **Abstract of The Disclosure**

[0045] A method and apparatus of high speed multi-dimensional signaling via a modem has a processing method of utilizing prolate pulses to optimize the transmission capacity of the channel. The modem includes a process that segments the channel bandwidth and allocates the power and bit loading in relation to a measure of the noise in each spectral bin. Data are carried over a plurality of frequencies across the channel, and within each spectral bin, a plurality of orthogonal signaling dimensions.